

CLAIMS

1. A rare-earth sintered magnet comprising an $R_2T_{14}Q$ type tetragonal compound (where R is at least one rare-earth element, T is at least one transition metal element always including Fe, and Q is boron and/or carbon) as a main phase and a grain boundary phase surrounding the main phase,

wherein the $R_2T_{14}Q$ type tetragonal compound as the main phase includes Cr, which substitutes for a portion of Fe, and carbon, which substitutes for a portion of boron, as respective essential elements, and

wherein the concentration of carbon in the main phase is higher than that of carbon in the grain boundary phase.

2. The rare-earth sintered magnet of claim 1, wherein 50 at% to 90 at% of the overall grain boundary phase is Co.

3. The rare-earth sintered magnet of claim 2, wherein the grain boundary phase includes an R_3Co compound.

4. The rare-earth sintered magnet of one of claims 1 to

3, wherein the $R_2T_{14}Q$ type tetragonal compound as the main phase further includes Co as another essential element that substitutes for a portion of Fe.

5 5. The rare-earth sintered magnet of one of claims 1 to 4, comprising:

12 at% to 18 at% of R,

60 at% to 88 at% of T,

0.1 at% to 2.4 at% of Cr,

10 0.5 at% to 13 at% of B, and

0.4 at% to 4.5 at% of C.

6. A rare-earth sintered magnet comprising an $R_2T_{14}Q$ type tetragonal compound (where R is at least one rare-earth element, T is at least one transition metal element always including Fe, and Q is boron and/or carbon) as a main phase and a grain boundary phase surrounding the main phase,

wherein the $R_2T_{14}Q$ type tetragonal compound has a natural electrode potential of -0.75 V or more.

7. The rare-earth sintered magnet of claim 6, wherein a difference in natural electrode potential between the $R_2T_{14}Q$ type tetragonal compound and the grain boundary phase is at most 0.6 V.

5

8. A method for producing a rare-earth sintered magnet, the magnet including an $R_2T_{14}Q$ type tetragonal compound (where R is at least one rare-earth element, T is at least one transition metal element always including Fe, and Q is boron and/or carbon) as a main phase and a grain boundary phase surrounding the main phase, the method comprising the steps of:

preparing a powder of a main phase alloy, at least 50 vol% of which is the $R_2T_{14}Q$ type tetragonal compound and which includes Cr, boron and carbon as respective essential elements, and a powder of a liquid phase alloy including R and Co; and

sintering the powders, thereby making a rare-earth sintered magnet in which the concentration of carbon in the main phase is higher than that of carbon in the grain

boundary phase.

9. The method of claim 8, wherein the main phase alloy includes:

5 11 at% to 16 at% of R,
 60 at% to 87 at% of T,
 0.2 at% to 2.5 at% of Cr,
 1 at% to 14 at% of B, and
 0.5 at% to 5.0 at% of C.

10

10. The method of claim 9, wherein a first alloy including 0.8 mass% to 1.0 mass% of Q and a second alloy including 1.2 mass% to 1.4 mass% of Q are used as the main phase alloy.

15

11. The method of claim 9, wherein the liquid phase alloy includes:

 60 at% to 80 at% of R and
 20 at% to 40 at% of Co.

20

12. The method of one of claims 8 to 11, wherein the ratio of the liquid phase alloy to the sum of the main phase and liquid phase alloys is defined within the range of 2 vol% to 20 vol%.

5

13. The method of one of claims 8 to 12, further comprising the steps of:

preparing a melt of a material alloy for the main phase alloy; and

10 cooling and solidifying the melt of the material alloy at a rate of 100 °C/s to 10,000 °C/s.